

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

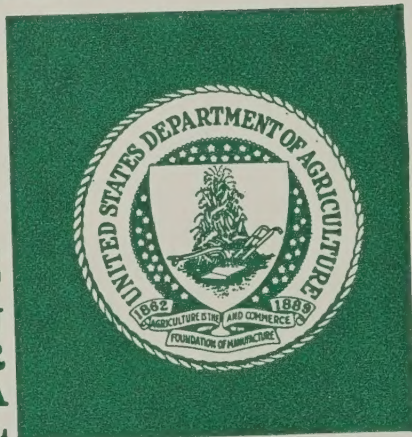
aSB952
.M4G4

USDA, National Agricultural Library
NAL Bldg
10301 Baltimore Blvd
Beltsville, MD 20705-2351

AD-33 Bookplate
(1-63)

NATIONAL

**A
G
R
I
C
U
L
T
U
R
A
L**



LIBRARY

245 10
METHOMYL FOR INSECT CONTROL
ON KALE, COLLARDS, MUSTARD GREENS & TURNIP GREENS [Paul D. Gerhardt]

500
Cooperative Agreement No. 12-14-5001-234

Objective:

The objective of this project was to develop sufficient data to assist in a minor crop registration for Methomyl (Lannate) on mustard greens, turnip greens, kale and collards. Efficacy data were to be obtained on the above crops for those lepidopterous pests that were present during the growing of the crop.

Plant residue samples were to be taken at selected intervals after the last application of insecticide Methomyl.

Residue analysis for Methomyl was to be done by a commercial laboratory, and the resulting data was to be made available for the registration for the use of Methomyl on the above crops.

Methods and Materials:

Seed of the following crops were planted at the University of Arizona Mesa Farm, in Field F, Borders 48-51:

<u>Crop</u>	<u>Variety</u>
Turnip greens	Purple Top White Globe
Mustard greens	Green Wave
Kale	Dwarf Green Curl
Collards	Vates Strain

U. S. DEPT. OF AGRICULTURE
NATIONAL AGRICULTURAL LIBRARY

JAN 23 1978

CATALOGING PREP.

Soil type on the Mesa Farm is sandy Laveen clay loam.

Planting was August 27, 1976, on regular 40-inch wide beds with two seed rows per bed. Seed was planted in a dry seed bed using a vegetable planting sled with Planet Jr. planters, and the various crops were irrigated up.

The seedling plants were thinned on September 15 and 17, to the following plant spacings: kale, collards and mustard greens--12 inches; and turnip greens

--3 inches.

Insect counts were started on September 28, 1976. Insect counts were made by examining 10 plants from the middle two rows of each plot for a total of 30 plants for the three replicates.

The only insect for which counts were made was the cabbage looper, *Trichoplusia ni* (Hubner). A few beet armyworms, *Spodoptera exigua* (Hubner), were present early but the numbers present were so few that no meaningful count could be made. Both Diamondback Moth, *Plutella xylostella* (Linnaeus) and Imported Cabbageworm, *Pieris rapae* (Linnaeus), were not present in the crops planted. The only insect which appeared in the plots in any number was the cabbage looper.

Insecticide applications were made with a backpack CO₂ pressurized hand sprayer and a light weight hand boom. All spray materials were applied as 35 gallons of spray mixture per acre at 50-55 psi pressure. First spray applications were made with a single hollow cone type nozzle per row. Each nozzle was fitted with a D-3 tip and #45 core and 50 mesh screen. As the plants increased in size, two nozzles per plant row were used, each having a D-3 tip and #25 core.

Spray applications were applied at approximately weekly to 10-day intervals, depending upon the crops.

Spray treatments for the various crops were applied as follows: turnip greens and mustard greens--September 30, October 8 and 18; collard and kale--September 30, October 8, 15 and 22 and November 1.

Residue samples were taken at 1, 3, 7 and 14 days after last spray application.

Turnip greens and mustard greens were sampled beginning October 19. Kale and collard residue samples were taken beginning November 2. The later date for the last two crops was due to their slower development.

Each residue sample was made up of a 50-leaf total with 17 leaves taken from the A and B replicate and 16 leaves from the C replicate. A 50-leaf sample from the untreated check plots were taken for each crop for each of the sampling dates. Samples were placed in heavy plastic bags and placed in a deep freeze locker where they were held frozen until ready for residue analysis.

Residue analysis of the above samples were run by Chemonics Laboratory, Phoenix, Arizona, using gas chromatography and the DuPont procedure for Methomyl analysis.

Results:

The results of the insect counts are presented in Table 1-4. These tables only present the number of cabbage looper eggs and larvae found in the various treatments. Observations for beet armyworms were made at the same time, but beet armyworm populations were very low and the other insects were not present.

In Table 1, the cabbage looper counts on collards are shown. Larva counts were low on the first two dates, but began to increase with the October 21 and 28 sampling dates. The high dosage of Lannate, 1.8 lb. ai/acre, gave better control than the 0.45 lb. ai/acre rate.

Table 2 presents the results of the cabbage looper eggs and larvae counts on kale with much the same population levels as found on the collards. The overall observation indicates a lower looper population on kale than on the collards. Even the looper population was not as heavy as it had been in previous years. The looper population in the untreated check was not high either. The heavy rate of the Lannate again gave the better control.

In Table 3 are presented the results of the looper counts on mustard greens. Eggs present were very low with almost no larvae present. This would indicate that the adult loopers were either not attracted to the mustard leaves or were

repelled, probably due to the hairy nature of the leaf surface and the presence of more acceptable crops nearby.

Table 4 presents the cabbage looper counts made on the turnip greens. Results were much the same as that obtained on the mustard greens with very low egg deposits with almost no larvae present. This again, would indicate a non-preference for turnip greens by the cabbage loopers.

Phytotoxicity data was obtained on the various crops using a rating system of 0=5, with 0=no damage and 5-severe damage.

Phytotoxicity trials were run at one end of the planting with applications made on the following dates to determine the possible susceptibility of any of the crops to Methomyl; September 13, 17, 20, 27 and October 4 and 8. The first applications were made on very small plants to determine the effects on the seedlings. Results of these evaluations are presented in Table 5, which indicates Methomyl "L" spray applications did not cause phytotoxicity to collards and kale. Almost no phytotoxicity was caused to turnip greens and mustard greens, particularly at the 0.45 lb. ai/acre dosage level. On the other hand, the high dosage level of Methomyl "L" at 1.8 lbs. ai/acre did cause noticeable phytotoxicity to turnip and mustard greens.

Although the higher rates of Methomyl did cause phytotoxicity to the foliage of turnip and mustard greens, the damage was not excessive and the leaves thus affected were not leaves which would be harvested later. Sprays at all dosage levels applied later in the growing season, did not cause any phytotoxicity to leaves which would be harvested.

Residue Sampling:

Plant samples were taken for Methomyl residue analysis after the last insecticide application was made before harvest. For each of the three rates of Methomyl (0.45, 0.9 and 1.8 lbs. ai/acre), on each crop a sample was taken at 1, 3,

7 and 14 days after the last insecticide application.

Leaf samples for the residue samples were taken from the middle two rows of each plot. A total of fifty leaves were taken from the three replicates for each rate of Methomyl. After being placed in heavy duty plastic bags, the samples were taken directly from the field and placed in a walk-in deep freeze, where they were held at -24°F (-30.1°C) until ready to be analyzed.

After being held for several months they were transferred to storage facilities at Chemonics Laboratories, where the Methomyl analysis was performed.

The laboratory used DuPonts analytical method for Methomyl detection, using gas chromatography. Results of these analysis are presented in Tables 6 through 9, as follows:

Table 6 - Mustard Greens - Methomyl Residue Data

Table 7 - Turnip Greens - Methomyl Residue Data

Table 8 - Kale - Methomyl Residue Data

Table 9 - Collards - Methomyl Residue Data

In most cases the residue found at the 1.8 lb. rate of application at the one day sampling date was four times that of the 0.45 lb. rate on the same sampling date.

In all but one case the amount of residue found for all rates for all crops dropped considerably between the 1-day sample and the 14-day sample. The one exception to this was with kale at the 0.9 lb. ai rate where the 1-day sample showed 5.64 ppm Methomyl and the 3-day sample was 6.04 ppm. The 7-day and 14-day ppm residue was in line.

In all cases the residues dropped as the days after harvest increased. At this time it cannot be stated if the residues found on the samples would be within the accepted tolerance level.

10
11

12

13

14

15

16

17

18

19

20

21

Climatological Information:

The following are average temperatures for the growing season, 1976:

Date	Average		Rainfall (Total)
	Max.	Min.	
Aug. 27-31	105.2 ⁰	76.8 ⁰ F	0.0 inches
Sep. 1-30	93.5 ⁰	69.0 ⁰ F	1.68 inches
Oct. 1-30	83.5 ⁰	56.2 ⁰ F	0.84 inches
Nov. 1-15	80.1 ⁰	49.8 ⁰ F	0.70 inches

Paul D. Gerhardt
Professor of Entomology
Department of Entomology
University of Arizona
Tucson, Arizona

Table 1. Results of Insect Counts Taken on Collards^{1/} Treated with Lannate "L." Mesa Branch Station.
Fall 1976.

Treatments ^{2/}		Number of Cabbage Looper Eggs & Larvae/10 Plants										
Material	Amt/A		September 28		October 7		October 14		October 21		October 28	
	Form	Tox	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
Lannate "L" 1.8 lb/gal	1 qt	0.45 lb	4.3	0.3a ^{3/}	12.0	1.7a	3.0	2.3a	20.3	2.4a	18.0	7.0a
Lannate "L" 1.8 lb/gal	2 qt	0.90 lb	7.0	0.3a	7.0	1.0a	2.7	1.3a	29.7	0.3a	20.3	5.3a
Lannate "L" 1.8 lb/gal	1 gal	1.8 lb	4.7	0.0a	4.0	0.3a	6.0	0.3a	9.0	0.3a	13.7	0.7a
Check	-	--	4.7	0.0a	5.0	1.9a	4.3	3.3a	20.3	8.0a	12.3	13.6b

^{1/}Vates Strain variety planted August 27, 1976.

^{2/}Treatments applied September 30; October 8, 15, 22 and November 1.

^{3/}Duncan's Multiple Range Test, means followed by same letter are not significant at 5% level.

Table 2. Results of Insect Counts Taken on Kale^{1/} Treated with Lannate "L." Mesa Branch Station.
Fall 1976.

Treatments ^{2/}		Number of Cabbage Looper Eggs & Larvae/10 Plants										
Material	Form	Amt/A Tox	September 28		October 7		October 14		October 21		October 28	
			Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
Lannate "L" 1.8 lb/gal	1 qt	0.45 1b	4.3	0.3a ^{3/}	4.7	1.7a	1.7	0.3a	13.3	0.7a	3.0	2.3a
Lannate "L" 1.8 lb/gal	2 qt	0.90 1b	3.0	0.0a	4.7	1.0a	3.3	0.3a	11.7	0.0a	11.0	1.0a
Lannate "L" 1.8 lb/gal	1 gal	1.80 1b	4.7	0.0a	4.0	0.3a	6.0	0.0a	9.0	0.3a	13.7	0.7a
Check	-	--	2.5	0.5a	3.0	1.0a	3.7	1.3a	6.0	2.3a	7.7	2.7a

^{1/}Dwarf Green Curl variety planted August 27, 1976.

^{2/}Treatments applied September 30; October 8, 15, 22 and November 1.

^{3/}Duncan's Multiple Range Test, means followed by same letter are not significant at 5% level.

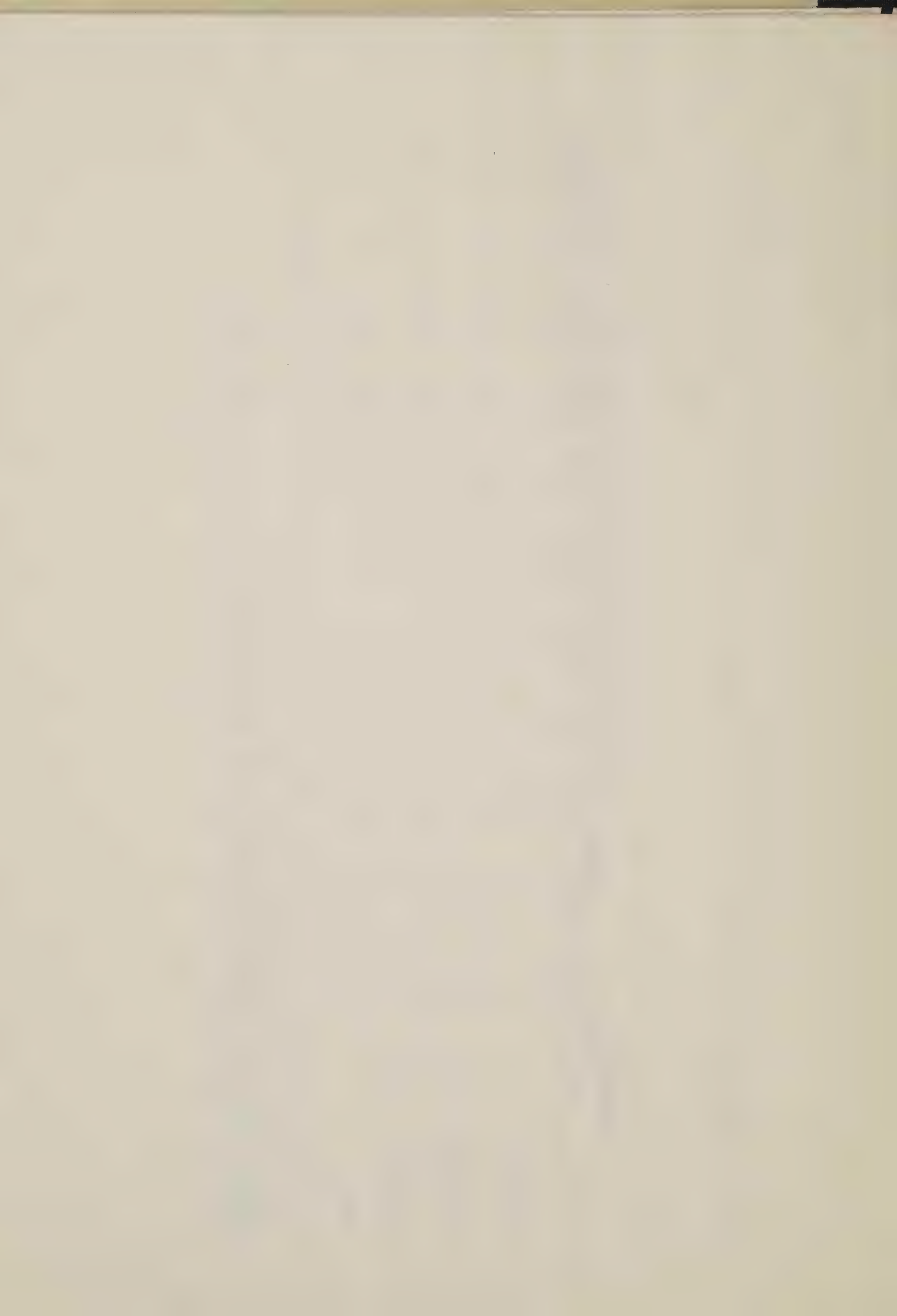


Table 3. Results of Insect Counts Taken on Mustard Greens^{1/} Treated with Lannate "L." Mesa Branch Station. Fall 1976.

Treatments ^{2/}		Number of Cabbage Looper Eggs & Larvae/10 Plants						
Material	Amt/A		September 28		October 7		October 14	
	Form	Tox	Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
Lannate "L" 1.8 lb/gal	1 qt	0.45 1b	0.0	0.0a ^{3/}	0.0	0.3a	0.3	0.0a
Lannate "L" 1.8 lb/gal	2 qt	0.90 1b	0.0	0.0a	0.7	0.0a	0.7	0.0a
Lannate "L" 1.8 lb/gal	1 gal	1.8 1b	0.3	0.0a	0.0	0.0a	0.0	0.0a
Check	-	--	0.7	0.0a	0.0	0.0a	0.0	0.3a

^{1/}Green Wave variety planted August 27, 1976.

^{2/}Treatments applied September 30 and October 8, 18.

^{3/}Duncan's Multiple Range Test, means followed by same letter are not significant at 5% level.

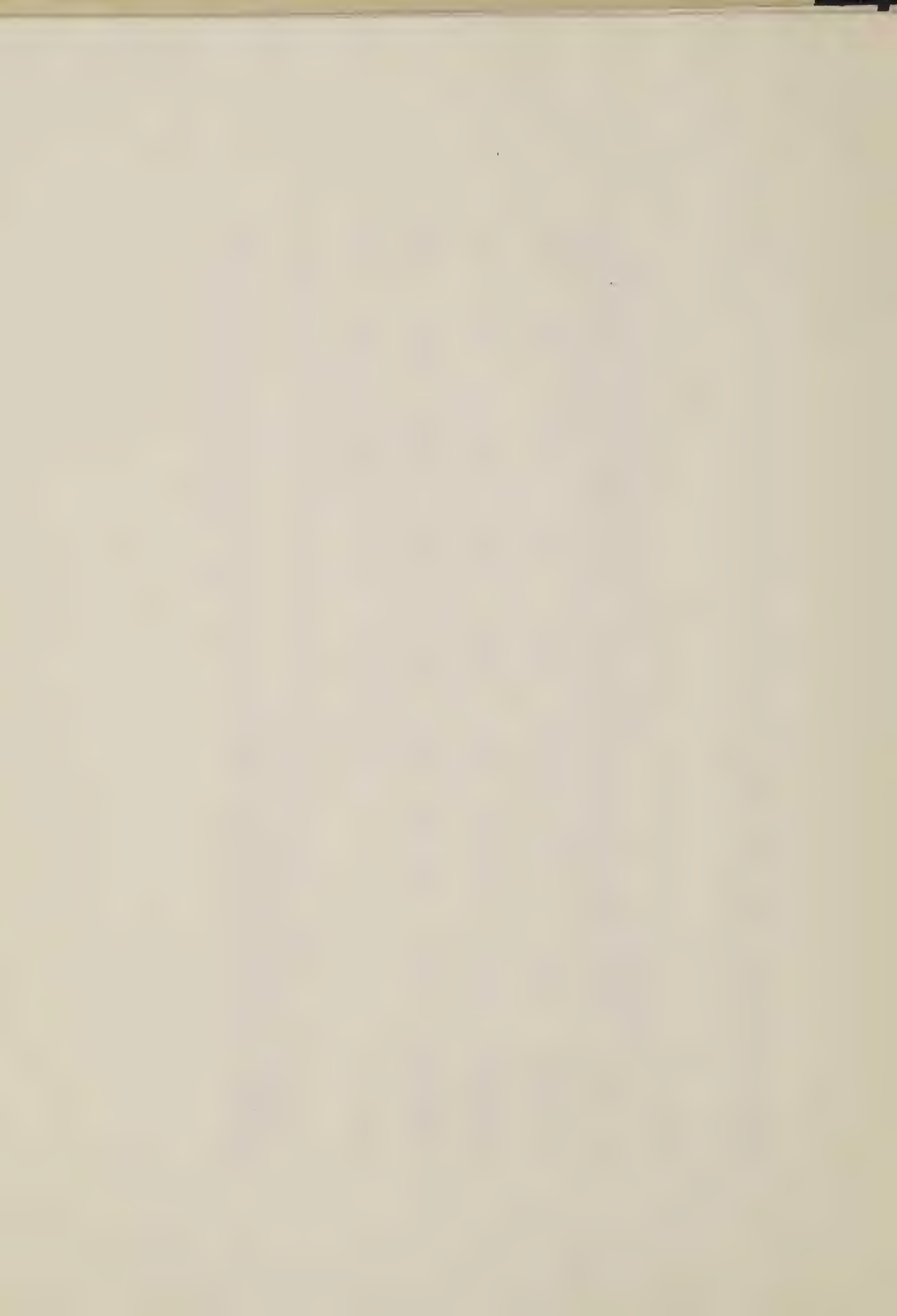


Table 4. Results of Insect Counts Taken on Turnips^{1/} Treated with Lannate "L." Mesa Branch Station. Fall 1976.

Material	Treatments ^{2/} Form	Amt/A Tox	Number of Cabbage Looper Eggs & Larvae/10 Plants					
			September 28		October 7		October 14	
			Eggs	Larvae	Eggs	Larvae	Eggs	Larvae
Lannate "L" 1.8 lb/gal	1 qt	0.45 1b	0.7	0.0a ^{3/}	1.0	0.0a	0.3	0.0a
Lannate "L" 1.8 lb/gal	2 qt	0.90 1b	1.0	0.0a	1.0	0.3a	0.3	0.0a
Lannate "L" 1.8 lb/gal	1 gal	1.8 1b	0.0	0.0a	0.6	0.0a	0.0	0.0a
Check	-	--	1.0	0.0a	0.0	0.0a	0.3	0.7a

^{1/}Purple Top - White Globe variety planted August 27, 1976.

^{2/}Treatments applied September 30 and October 8, 18.

^{3/}Duncan's Multiple Range Test, means followed by same letter are not significant at 5% level.

Table 5. Results of Phytotoxicity Rating for Plants Treated with Lannate Liquid. Mesa Branch Station. Fall 1976.

Material	Treatments ^{1/}		September 17					September 20		
	Form	Amt/A Tox	Collards ^{2/}	Kale ^{3/}	Turnip Greens ^{4/}	Mustard Greens ^{5/}	Collards	Kale	Turnip Greens	Mustard Greens
Lannate "L" 1.8 lbs/gal	1 qt	.45 lb	0.0 ^{6/}	0.0	0.0	0.0	0.0	0.0	1.0	0.3
Lannate "L" 1.8 lbs/gal	2 qt	.90 lb	0.0	0.0	1.0	0.7	0.0	0.0	1.0	0.7
Lannate "L" 1.8 lbs/gal	1 gal	1.8 lb	0.0	0.0	2.0	1.3	0.0	0.0	2.0	2.0
Check	-	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

^{1/}Treatments applied September 13, 17, 20, 27 and October 4 and 8.

^{2/}Vates Strain Collards.

^{3/}Dwarf Green Curl Kale.

^{4/}White Globe Purple Top Turnip.

^{5/}Green Wave Mustard.

^{6/}Phytotoxicity rating 0 = no damage - 5 = severe damage.

Table 5. Continued.

Treatments		September 27					October 11			
Material	Form	Amt/A	Tox	Collards	Kale	Turnip Greens	Mustard Greens	Collards	Kale	Turnip Greens
Lannate "L" 1.8 lbs/gal	1 qt		.45 lb	0.0	0.0	0.3	0.3	0.0	0.0	0.0
Lannate "L" 1.8 lbs/gal	2 qt		.90 lb	0.0	0.0	1.0	0.7	0.0	0.0	1.0
Lannate "L" 1.8 lbs/gal	1 gal		1.8 lb	0.0	0.0	1.3	2.0	0.0	0.0	2.0
Check	-		---	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 6.

Methomyl Residue Data

Mustard Greens - Variety Green Wave

Foliage Samples

<u>Treatment</u>	<u>Amt.^{1/} per acre</u>	<u>No. Applications</u>	<u>Sample^{2/} Days after last app.</u>	<u>Residue ppm</u>
Lannate "I" 1.8 lbs/gal	0.45 lb AI	3	1	2.89
Lannate "I" 1.8 lbs/gal	0.45 lb AI	3	3	1.31
Lannate "I" 1/8 lbs/gal	0.45 lb AI	3	7	0.151
Lannate "L" 1.8 lbs/gal	0.45 lb AI	3	14	0.045
Untreated Check	----	-	(14)	0.025
Lannate "I" 1.8 lbs/gal	0.9 lb AI	3	1	4.35
Lannate "I" 1.8 lbs/gal	0.9 lb AI	3	3	3.79
Lannate "I" 1.8 lbs/gal	0.9 lb AI	3	7	0.735
Lannate "I" 1.8 lbs/gal	0.9 lb AI	3	14	0.151
Lannate "I" 1.8 lbs/gal	1.8 lb AI	3	1	11.6
Lannate "I" 1.8 lbs/gal	1.8 lb AI	3	3	6.43
Lannate "I" 1.8 lbs/gal	1.8 lb AI	3	7	1.93
Lannate "I" 1.8 lbs/gal	1.8 lb AI	3	14	0.57

^{1/}Applied at 35 gallons spray mixture per acre.^{2/}Last spray treatment applied October 18, 1976.

able 7.

Methomyl Residue Data

Turnip Greens - Variety Purple Top White Globe

Foliage Samples

<u>Treatment</u>	<u>Amt.^{1/} per acre</u>	<u>No. Applications</u>	<u>Sample^{2/} Days after last app.</u>	<u>Residue ppm</u>
Lannate "I" 1.8 lbs/gal	0.45 lb AI	3	1	6.20
Lannate "I" 1.8 lbs/gal	0.45 lb AI	3	3	3.08
Lannate "I" 1.8 lbs/gal	0.45 lb AI	3	7	0.511
Lannate "I" 1.8 lbs/gal	0.45 lb AI	3	14	0.108
Lannate "I" 1.8 lbs/gal	0.9 lb AI	3	1	9.09
Lannate "I" 1.8 lbs/gal	0.9 lb AI	3	3	5.16
Lannate "I" 1.8 lbs/gal	0.9 lb AI	3	7	1.46
Lannate "L" 1.8 lbs/gal	0.9 lb AI	3	14	0.403
Untreated Check	---	-	(14)	0.045
Lannate "I" 1.8 lbs/gal	1.8 lb AI	3	1	25.3
Lannate "I" 1.8 lbs/gal	1.8 lb AI	3	3	9.86
Lannate "I" 1.8 lbs/gal	1.8 lb AI	3	7	2.46
Lannate "L" 1.8 lbs/gal	1.8 lb AI	3	14	1.26

^{1/}Applied as 35 gallons spray mixture per acre.

^{2/}Last spray treatment applied October 18, 1976.

ble 8.

Methomyl Residue Data

Kale - Variety Dwarf Green Curl

Foliage Samples

<u>Treatment</u>	<u>Amt.^{1/} per acre</u>	<u>No. Applications</u>	<u>Sample^{2/} Days after last app.</u>	<u>Residue ppm</u>
Lannate "1" 1.8 lbs/gal	0.45 lb AI	5	1	1.81
Lannate "1" 1.8 lbs/gal	0.45 lb AI	5	3	1.23
Lannate "1" 1.8 lbs/gal	0.45 lb AI	5	7	0.882
Lannate "1" 1.8 lbs/gal	0.45 lb AI	5	14	0.069
untreated Check	---	-	(1)	0.015
Lannate "1" 1.8 lbs/gal	0.9 lb AI	5	1	5.64
Lannate "1" 1.8 lbs/gal	0.9 lb AI	5	3	6.04
Lannate "1" 1.8 lbs/gal	0.9 lb AI	5	7	2.23
Lannate "1" 1.8 lbs/gal	0.9 lb AI	5	14	0.139
Lannate "L" 1.8 lbs/gal	1.8 lb AI	5	1	26.6
Lannate "1" 1.8 lbs/gal	1.8 lb AI	5	3	13.1
Lannate "1" 1.8 lbs/gal	1.8 lb AI	5	7	4.08
Lannate "1" 1.8 lbs/gal	1.8 lb AI	5	14	0.678

^{1/} Applied at 35 gallons spray mixture per acre.
^{2/} Last spray treatment applied November 1, 1976.

Table 9.

Methomyl Residue Data

Collards - Variety-Vates Strain

Note: This data not available due to delay by Analytical Laboratory in running analysis. Will be available at a later date.

